

EC centrifugal fans with 3-phase Active PFC.

The integrated solution for RadiCal and RadiPac.

ebmpapst

The engineer's choice



About ebm-papst.

As technological leader for ventilation and drive engineering, ebm-papst is in demand as an engineering partner in many industries. With over 15,000 different products, we provide the right solution for just about any challenge. Our fans and drives are reliable, quiet and energy-efficient.



Six reasons that make us the ideal partner:

Our systems expertise. As experts in advanced motor technology, electronics and aerodynamics, we provide system solutions from a single source.

Our spirit of invention. Our 600 engineers and technicians will develop a solution that precisely fits your needs.

Our lead in technology. Our GreenTech EC technology is setting standards worldwide. And our lead is your competitive advantage.

Closeness to our customers. At 49 sales offices worldwide.

Our standard of quality. Our quality management is uncompromising, at every step in every process.

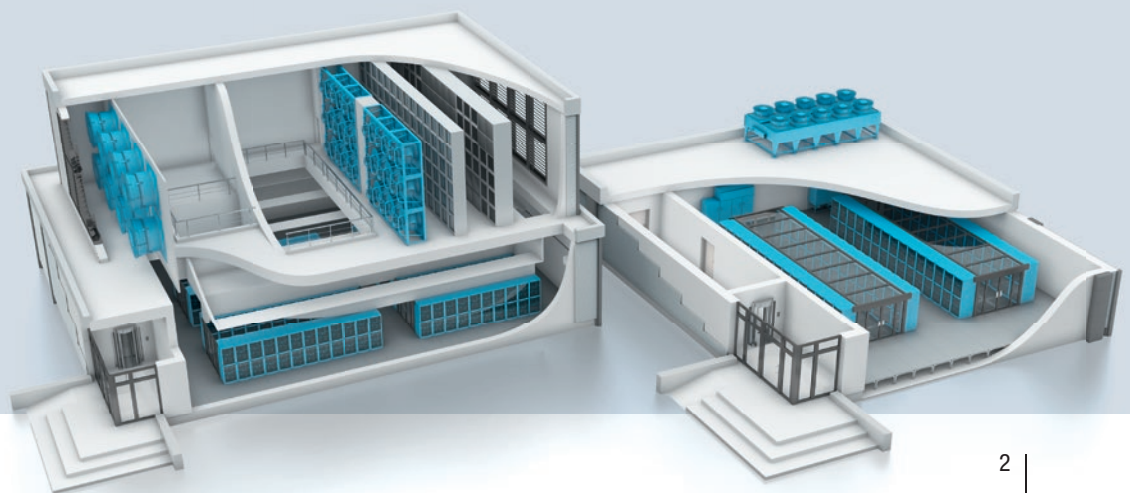
Our sustainable approach. We assume responsibility with our energy-saving products, environmentally-friendly processes, and social commitment.

Problem ...

Where high-performance cooling is required, e.g. in server rooms, use is often made of FanGrids to provide the required cooling capacity. The parallel operation of multiple EC fans can however very quickly lead to the permissible harmonic limit values being exceeded. The problem: The resultant harmonics increase the load on the supply network, and reactive power gives rise to losses. There may also be a negative influence on other devices in the system network. In the past this used to mean: Operators had to fit external harmonic filters, ensure adequate power factor correction and possibly make use of larger cable cross-sections.

... solved.

The good news: External components are now no longer required. To minimize the problem of harmonics with the parallel operation of EC centrifugal fans, ebm-papst has come up with a solution where the harmonic filter is already integrated: namely, Active PFC (Power Factor Correction). Emergency power supplies can be accordingly downsized, thus optimizing costs – a topic of particular importance in connection with FanGrid applications or precision air-conditioning units in data centers.



Current value – added value.

The value of the power factor (PF) indicates the extent to which the waveform of the input current matches the ideal waveform, as well as the magnitude of the phase angle between current and voltage. Ideally this would be: PF = 1.0.

THD(I) stands for Total Harmonic Distortion of Current and indicates the amount of current distortion. The value is defined as the quotient (in %) of the rms value of the harmonic currents relative to the fundamental.

Standard:

- THD(I) well above the 5% often demanded
- Installation work and extra space are required for additional external filters
- Dimensioning of external filters is difficult

Active PFC converts the pulsed input current of the EC motors into a sinusoidal current. In a second step, the position of the current curve is then shifted so that it is in phase with the voltage. Since the introduction of the standard IEC 61000-3-2 concerning the reduction of current harmonics, Active PFC has become an ever more popular filtering technique for line-operated devices.

Your benefits:

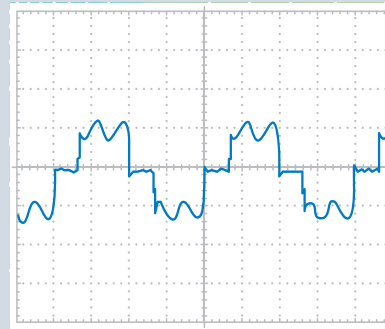
- Compliance with technical connection conditions of suppliers
- Better dimensioning of emergency power supply
- Reliable dimensioning of electrical equipment (e.g. fuses, transformers, switches, conductor cross-sections etc.)

All the advantages at a glance:

- Minimal current harmonics, even in part load operation
- Problem-free parallel connection of multiple fans
- Perfect interaction of efficient centrifugal fans and electronics with Active PFC
- One product, one supplier – the ideal one-stop solution
- THD(I) ≤ 5% over a broad power range
- No additional wiring work required (“Plug & play”)



Current waveform with “Passive PFC”

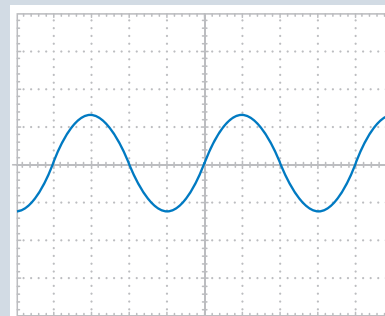


U1	400 V/50 Hz
I1	4,25 Arms 6,9 Apeak
P1	2,825 kW
Q1	1,00 kVA
S1	2,99 kVA
PF	0,94
THD (I)	33,5 %

ebm-papst series product:

Power factor (λ) = 0.94, THD(I) 33.5%

Current waveform with “Active PFC”

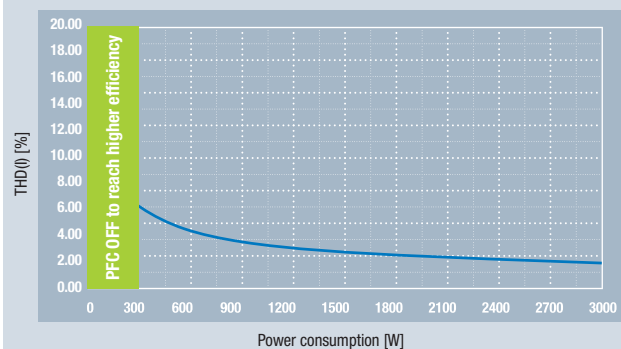


U1	400 V/50 Hz
I1	4,1 Arms 6,0 Apeak
P1	2,82 kW
Q1	0,08 kVA
S1	2,82 kVA
PF	0,998
THD (I)	≤5 %

ebm-papst new development:

Power factor (λ) = 0.99, THD(I) ≤ 5%

Current harmonics



Result:

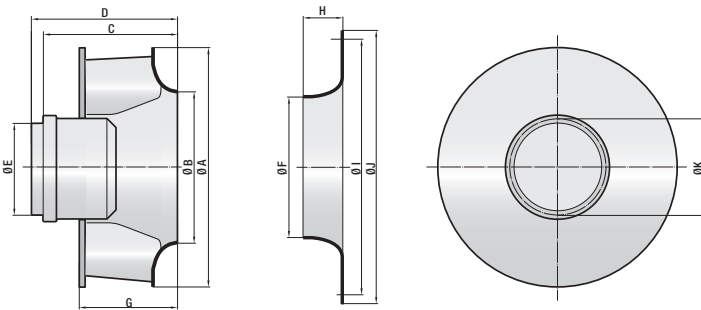
With 10–100% rated output, THD(I) is ≤ 5%

Outer dimensions ...

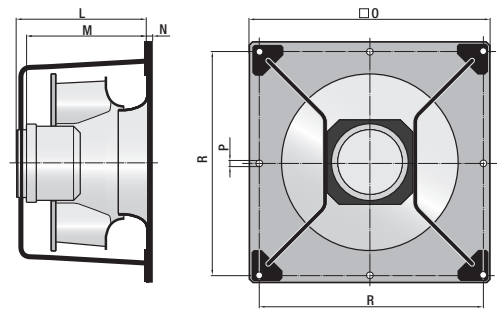
The newly developed 3-phase electronics with Active PFC are incorporated in the RadiCal and RadiPac EC centrifugal product ranges. By filtering out the harmonic disturbance, the fans attain excellent power factors of up to $\lambda = 0.99$. In addition, the current peaks are reduced by up to 50%.

Multiple fans can thus be connected in parallel without the need for any additional work. And so EC fans with Active PFC from ebm-papst open up whole new perspectives for your applications.

R3G motor-impeller ...



K3G built-in module support bracket ...



Size	Item number		A	B	C	D	E	F	G	H	I	J	K	L	T	N	O	P	R
RadiPac																			
450	R3G 450-PA21-C1	K3G 450-PA21-C1	530	320	309	422	280	303	254	76	445	480	304	488	375	15	630	11 (8x)	580
500	R3G 500-PA26-C1	K3G 500-PA26-C1	585	355	341	454	280	342	282	75	445	470	304	519	406	15	630	11 (8x)	580
560	R3G 560-PB22-C1	K3G 560-PB22-C1	655	398	371	484	280	385	314	82	490	515	304	555	442	15	800	11 (8x)	750
RadiCal																			
500	R3G 500-RA26-C1	K3G 500-RA26-C1	525	335	263	376	280	320	227	75	445	470	304	432	319	15	630	11 (8x)	580
560	R3G 560-RB27-C1	K3G 560-RB27-C1	570	418	294	407	280	407	253	84	540	565	304	468	355	15	800	11 (8x)	750
630	R3G 630-RB22-C1	K3G 630-RB22-C1	660	472	338	451	280	452	290	87	600	634	304	515	402	15	800	11 (8x)	750

All specifications in mm, data sheet on request.
Data is subject to change without notice at ebm-papst discretion.

Would you like to know more?

You can obtain further information on the new innovative Active PFC in 3-phase electronics straight from our experts. We would be delighted to receive your e-mail. Write to info1@de.ebmpapst.com.

Ingenious in every way.

Simple installation

- + Central terminal area for supply connection, alarm relay, open-loop control and communication
- + Safe separation of terminal area and electronics
- + High-quality terminals
- + No adjustment effort, as motor and control electronics come as a complete package

Flexible open-loop control

- + Infinitely variable speed control
- + Control signal 0–10 V DC/PWM and MODBUS-RTU
- + Open-collector tach signal



RadiPac centrifugal fan

- + High efficiency over a broad operating range
- + Aerodynamically optimized impeller
- + Unrivalled compactness
- + Rugged design



Efficiency



Power Density



Control



Noise



Plug&Play



Compactness



Monitoring



Sustainability

With integrated Active PFC

- + Active power factor correction minimizes harmonic disturbance
- + Attains power factor of up to $\lambda = 0.99$

Safe operation

- + Safe shutdown in the event of locked rotor
- + Optional speed and alarm output
- + Electronics with degree of protection IP69K
- + Overvoltage protection
- + Environment-resistant cable glands
- + Reverse polarity protection
- + Integrated locked-rotor and thermal overload protection

Universally deployable

- + Wide voltage range for use worldwide
- + Suitable for use with 50 and 60 Hz networks

RadiCal centrifugal fan

- + Perfectly matched components
- + High efficiency thanks to improved ventilation technology and GreenTech EC motors
- + Noise reduction thanks to optimized impeller
- + Unrivalled compactness



Efficiency



Power Density



Control



Noise



Plug&Play



Compactness



Monitoring



Sustainability



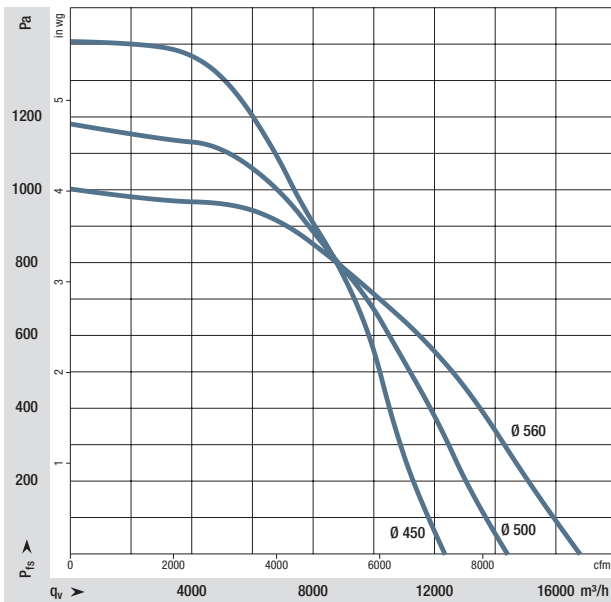
... and inner values.

Fan power measurements are carried out on state-of-the-art chamber test rigs. The entire fan unit, consisting of motor, control electronics and impeller, is measured in various load states. This ensures that we obtain reliable data, and that you can count on these values being reached when selecting a fan. Then there is no chance of unpleasant surprises when installing the fans.

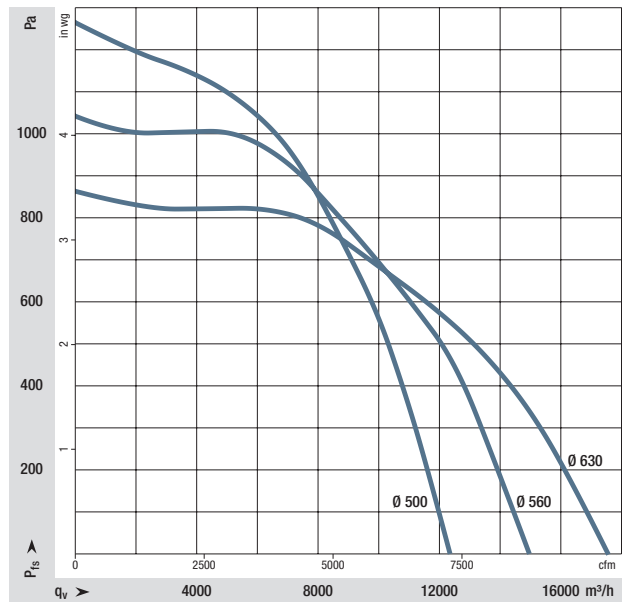
The measured data forms the basis for our design program, FanScout, which is available on request.

This software can be used to calculate the expected operating costs or to perform lifecycle cost analyses.

RadiPac



RadiCal



Nominal data		Nominal voltage range	Frequency	Speed	Max. power consumption	Max. input current	Perm. ambient temperature	Weight of R3G	Weight of K3G	
Size	Item number	VAC	Hz	rpm	W	A	°C	kg	kg	
RadiPac										
450	R3G 450-PA21-C1	K3G 450-PA21-C1	3~380-480 V	50/60	2,200	3,190	4.6	-25...+40	27.5	45.5
500	R3G 500-PA26-C1	K3G 500-PA26-C1	3~380-480 V	50/60	1,810	3,100	4.5	-25...+40	28.5	46.5
560	R3G 560-PB22-C1	K3G 560-PB22-C1	3~380-480 V	50/60	1,470	3,060	4.4	-25...+40	34	61
RadiCal										
500	R3G 500-RA26-C1	K3G 500-RA26-C1	3~380-480 V	50/60	1,820	3,190	4.6	-25...+40	28	43.5
560	R3G 560-RB27-C1	K3G 560-RB27-C1	3~380-480 V	50/60	1,660	3,190	4.6	-25...+40	33.5	58
630	R3G 630-RB22-C1	K3G 630-RB22-C1	3~380-480 V	50/60	1,350	3,200	4.6	-25...+40	36	61.5

Data sheet on request. Data is subject to change without notice at ebm-papst discretion.

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